SURFACE SEALED REINFORCED BUILDING ELEMENT

FIELD OF THE INVENTION

The present invention relates to a reinforced and preferably surface sealed building element and to a method and apparatus for the manufacture of these elements.

The invention was developed primarily for building sheet materials made predominantly from fibre cement and will be described hereinafter with reference to this application. However, it will be clear that the invention is not limited to this particular use and can readily be adapted to other building products and/or elements made from different materials.

BACKGROUND OF THE INVENTION

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

Selection of building materials for a given use depends largely upon the nature of the intended application and in many cases each of the products available represent a compromise between strength characteristics, durability and ease of installation, the latter being largely determined by workability characteristics such as ease of cutting, fixing and handling.

For example, natural timber has good inherent bending strength characteristics making it easy to transport and suitable for use in a variety of load bearing applications. However, it is generally fairly costly and lacks durability, particularly in damp or wet applications.

By contrast, manufactured wood products and fibre cement products, for example, are generally less expensive and more versatile in their application to form different shapes and types of building elements. However, these products generally have relatively lower bending strength to weight ratio due to their inherent weakness under tensile loads. They are also generally porous and prone to some degree of moisture absorption. While in the case of fibre cement products, this does not lead to significant reductions in durability, with most materials there is usually a resultant decrease in the strength characteristics with prolonged and cyclic exposure to moisture. There is also usually a corresponding increase in mass, which may be relevant to the issue of transportation and installation.

The problem of low bending specific strength in building elements made of homogenous bonded materials such as fibre cement has been addressed to some degree by using various forms of added reinforcement. In some cases a reinforcing element is introduced into the main body of the building material during manufacture. However, this has generally required major modifications to the material manufacturing process which can be costly and may inhibit the flexibility of the manufacturing plant.

Other solutions have included the step of externally attaching some form of reinforcing element to the completed base product using fasteners or an adhesive. Examples of this concept as applied to fibre cement building substrates are described in WO 02/081842. However, in conventional production processes, this additional step is generally off line from the normal production line, requires a specific additional fastener/adhesive, is labour intensive and/or time consuming thereby adding substantially to the cost of the product.

It is an object of the invention to provide a reinforced building element, and a method and apparatus for the manufacture of such elements, which overcomes or substantially ameliorates one or more of the disadvantages of the prior art or at least provides a useful alternative.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a reinforced building element including:

a rigid substrate having a first face; and

a layer of reinforcing material;

wherein said reinforcing material is adhered to said first face of said rigid substrate using a radiation curable resin.

The term "rigid" is used herein to refer to any kind of generally rigid and at least partially self supporting substrate and includes substrates that may have some degree of inherent flexibility due to their material and/or structure.

The term "radiation" is used herein to refer to radiation from U/V (ultra violet) to higher wavelengths.

According to a second aspect of the invention there is provided a method of manufacturing a reinforced building element including the steps of:

(a) applying a radiation curable resin to a first face of a rigid substrate;

(b) applying a reinforcing material to the layer of a radiation curable resin; and

(c) curing the resin to thereby adhere said reinforcing material to the rigid substrate.

The radiation curable material may be undergo full curing in a single step in step c). Alternatively the radiation curable coating may be partially cured as an initial step prior to application of the reinforcing material. Preferably this initial partial curing achieves a "tackiness" suitable for initial holding and positioning on the reinforcing material.

In one embodiment, the radiation curable material is fully cured prior to application of the reinforcing material. In this embodiment, the curable material is formulated to develop on adhesive/gripping texture on curing and thereby adhere the reinforcing material.

The coating of radiation curable resin may be formed from one or more layers, preferably two layers, and the layer of reinforcing material is applied and embedded between these layers. In other words, in a particularly preferred embodiment, the radiation curable material is applied, optionally this layer undergoes a partial cure, the reinforcing material is applied over the first layer of radiation curable material, a second layer of such curable material applied, or indeed a different formulation, and the entire assembly subject to full curing.

The method may also include the further action of optionally applying several layers of radiation curable material with or without partial/full curing, prior to application of the reinforcing material.

In other variations, the partial/full curing of the radiation curable material may be applied in combination with mechanical keying by surface scuffing with equipment such as a fine sander or denibber. These intermediate steps can be repeated as desired to build up the layers of material prior to final curing step.

According to a third aspect, the present invention comprises a method of manufacturing a reinforced building element including the steps of:

(a) combining a reinforcing material with a radiation curable resin, the quantity of resin being sufficient to adhere the reinforcing material to a rigid substrate;

(b) applying the combined reinforcing material and resin to a first face of a rigid substrate; and

(c) curing the resin to thereby adhere said reinforcing material to the rigid substrate.